

**REMARKS**

Claims 1-61 are pending with entry of this Amendment.

Applicant acknowledges the indicated allowability of Claims 8-9, 14, 23-24, 26, 36-37, 40-42-47, 51 and 56-59.

Claims 1-7, 10-13, 15-22, 25, 27-35, 38-39, 48-50, 52-55 and 60-61 stand rejected.

The following sections address *in seriatim* the points in the Office Action requiring response.

**Drawing Objection**

In response to the Office's objection to the drawings, Applicant has added new Figure 5 to illustrate the claimed subject matter of Claim 54. Withdrawal of the objection is respectfully requested. No new matter has been added.

**Specification Objection**

In response to the Office's objection to the specification, Applicant has amended paragraphs [0025], [0026], [0030] and [0043] to correct the informalities identified by the Examiner. Withdrawal of the objection is respectfully requested. No new matter has been added.

**Rejection under 35 U.S.C. § 112**

On pages 3-4 of the Action, the Office rejected Claim 41 under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Applicant has amended Claim 41 to correct the informality identified by the Examiner. Reconsideration and withdrawal of the rejection is respectfully solicited.

**Rejection under 35 U.S.C. § 101**

On page 4 of the Action, the Office improperly rejected Claim 38 under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Under MPEP § 706.03(a), the Office is required to provide an explanation of why claimed subject matter is not patent eligible subject matter by explaining:

- (a) why the claimed invention does not fall within at least one of the four categories of patent eligible subject matter recited in 35 U.S.C. 101 (process, machine, manufacture, or composition of matter); or
- (b) why the claimed invention is directed to a judicial exception to 35 U.S.C. 101 (i.e., an abstract idea, natural phenomenon, or law of nature) and is not directed to a practical application of such judicial exception (e.g., because the claim does not require any physical transformation and the invention as claimed does not produce a useful, concrete, and tangible result); or
- (c) why the claimed invention would impermissibly cover every substantial practical application of, and thereby preempt all use of, an abstract idea, natural phenomenon, or law of nature.

See MPEP § 706.03(a)(II). The Office conducted none of these analyses. Rather the Office concluded without any support that “A hopping frame as claimed is non-statutory subject matter.” See Action, page 3. Applicant is entitled to an explanation as to why the Office believes the subject matter of Claim 38 does not fall within at least one of the four categories of patent eligible subject matter, or why the claimed invention is directed to a judicial exception to 35 U.S.C. 101 and is not directed to a practical application of such judicial exception, or why the claimed invention would impermissibly cover every substantial practical application of an abstract idea.

In contrast to the unfounded conclusion by the Office, under the guidelines provided by the Federal Circuit in *State Street Bank & Trust Co. v. Signature Financial*

*Group, Inc.*, (149 F.3d 1368 (Fed. Cir. 1998), Claim 38 recites a useful concrete and tangible result (*i.e.*, a hopping frame) for transmitting data in a multiple-modulation indice continuous phase modulation waveform with frequency hopping. For such reasons at least, the rejection under 35 U.S.C. § 101 of Claim 38 is improper and must be withdrawn.

**Rejections under 35 U.S.C. § 103(a)**

1. Ho, Miller and Kim

On pages 4-11 of the Office Action, the Office improperly rejects Claims 1-7, 10, 12, 15-19, 22, 27-29, 30-32, 35-, 38-39, 49, 52, 54-55 and 60-61 under 35 U.S.C. §103(a) as being unpatentable over Ho in view of Miller and Kim. Applicant submits that these references fail to provide a *prima facie* case of obviousness, and Applicant respectfully requests withdrawal of the rejection under § 103(a).

In order for the Office to establish a *prima facie* case for obviousness, three (3) criteria must be met. First, there must be some suggestion or motivation, either in the cited prior art references or in the knowledge generally available to those of ordinary skill in the art, to modify the primary reference as the Office proposes. Second, there must be a reasonable expectation of success in connection with the Office's proposed combination of the references. Third, the prior art references must disclose or suggest all of the claimed limitations. *See* MPEP 2143. The Office has failed to establish a *prima facie* case for obviousness because the Office failed to satisfy its burden of showing that the prior art discloses or suggests all of the claimed elements of Claims 1-7, 10, 12, 15-19,

22, 27-29, 30-32, 35, 38-39, 49, 52, 54-55 and 60-61 and, as such, failed to satisfy its burden of showing that there is a suggestion or motivation to one of ordinary skill in the art to modify the primary reference as the Office proposes.

Claim 1 is instructive in this instance and recites:

A method of transmitting data as a continuous phase modulation waveform with a set of modulation indices and frequency hopping, comprising the steps of:

generating a plurality of data frames from the data;

**for each data frame**, coding the data into a sequence of symbols wherein the initial phase state is zero, **and appending a plurality of other symbols to the sequence of symbols to form a hopping frame wherein the final phase state of the hopping frame is zero;**

**modulating a fixed frequency carrier with the sequence of symbols for each hopping frame with a repeated sequence comprised of the set of modulation indices; and,**

transmitting the modulated hopping frame;

**wherein the carrier frequency for successive hopping frames are different**, thereby enabling frequency hopping transmission of the data as a continuous phase modulation waveform. (emphasis supplied).

Independent Claims 6, 38, 52 and 54 provide similar emphasized elements as identified above. The subject matter thus exploits the short constraint length and rotational invariance of a multi-h CPM waveform to enable frequency hopping. The claimed modulated hopping frame is structured such that the initial phase state of each hopping frame is cycled to zero by the addition of plural symbols. **These plural symbols allow an oscillator to change frequency without disrupting the phase progression.** None of the art of record, alone or in combination, teach, suggest or disclose this aspect.

In contrast, **Ho provides of a known prior art scheme to simply add a data dependent pilot symbol to a data frame for subsequent channel estimation for a single**

**frequency**. For example, Ho discloses an encoder 10 which receives input data and divides the data into data frames. *See* Ho at 2:39-45. Ho encodes the data as a function of the signalling response required, *i.e.*, full response CPM (Columns 6-7), partial response CPM (Columns 7-9), or Nyquist-3 Frequency Modulation (Column 9). These rules ensure that the modulation is forced to return to a known phase state periodically such as the zero phase state. *Id.* at 6:55-60.

While Ho indeed codes data into a sequence of symbols having an initial phase state of zero, *Ho forces the phase state to zero by using either a pilot symbol or, with  $h=1/M$ , using an even transmission frame size  $N$  with one data dependent pilot symbol per frame*. There is no disclosure, however, in Ho for each data frame, coding the data into a sequence of symbols wherein the initial phase state is zero, and appending a plurality of other symbols to the sequence of symbols to form a hopping frame wherein the final phase state of the hopping frame is zero. Indeed, there is no disclosure in Ho of the data frame structure as claimed.

Further, Ho fails to teach modulating a fixed frequency carrier with a sequence of symbols for each hopping frame with a repeated sequence comprised of the set of modulation indices. As there is no disclosure in Ho of multi- $h$  CPM, as admitted by the Office, there clearly cannot be a teaching of this element. Rather, for support of this element the Office referenced Col. 3, lines 7-15 and Col. 7, lines 1-27 of Ho. Col. 7, lines 1-27 of Ho describe the addition of a data dependent pilot symbol to force a phase state to zero as discussed above. Col. 3, lines 7-15 describes an example of a precoder trellis structure.

If the initial precoder state is even, a channel symbol of “1” is produced and if the initial precoder state is odd, a channel symbol of “-1” is produced. *See* 3:10-16. Once all data bits within the same frame are precoded into these channel symbols of 1 or -1, then pilot symbols are added. A sequence of encoded channel symbols are then fed to a modulator at a rate of one symbol per T second in a frame. The phase trajectory of the resulting CPM signal is given by equation (1) of Ho where h is the modulation index (*Id.* at 3: 47-65); however, this is not a disclosure in Ho of modulating a fixed frequency carrier with the sequence of symbols for each hopping frame with a repeated sequence comprised of the set of modulation indices.

Furthermore, there is no disclosure in Ho of the element of “wherein the carrier frequency for successive hopping frames are different” and ***the Office has not referenced a teaching in Ho or the other cited references for this element.*** For at least these reasons, the primary reference cannot provide proper *prima facie* support for a rejection under 35 U.S.C. § 103(a) and the rejection must be withdrawn.

The Office, however, improperly attempts to supplement the deficiencies of Ho with the teachings of Miller and Kim. Miller is cited for the teaching of multi-h CPM and Kim is cited for teaching a slow frequency-hopping spread spectrum system. While Miller indeed discloses a multi-h CPM waveform and Kim discloses a frequency-hopping spread spectrum system, the Office has not provided any teaching or motivation **in the references to combine these references with Ho.**

For example, Miller provides a synchronization preamble (See Fig. 1) for a multi-h CPM waveform to assist in acquisition of a waveform. The synchronization preamble consists of a preamble bit pattern of 192 bits, a 16 bit message and a header preceding the data traffic. The header provides additional information about the data traffic and modulation to follow. As the header in Miller is necessary to receive data traffic, Miller selects a repetition code comprising 12 bits of the header repeated 3 times. *See Miller p. 1341.* To allow a Viterbi demodulator for the MSK-modulated header, 6 flush bits conclude the 36 bits of configuration data. These flush bits are appended to the header, as admitted by the office, to return the modulator to a known phase state, and allow time for the receiver to process the header. *See Miller p. 1341.* The flush bits, however, are not appended to the data frame. Indeed, the header precedes the data frame in Miller (see Fig. 1). Thus, the flush bits of Miller cannot provide the necessary structure in a hopping frame such that the initial phase state of each hopping frame is cycled to zero by the addition of plural symbols whereby the plural symbols allow an oscillator to change frequency without disrupting the phase progression.

Further, it is not inherent, as asserted by the Office in its rejection of Claim 38, that the header is equal to the constraint length defined by multiple modulation indices. As the Office is surely aware, to be inherent, an asserted element must necessarily be present. As discussed in paragraph [0005] of Applicant's background, the constraint length is the length of time (*i.e.*, the number of symbols) it takes for two paths that start at the same state to later merge. Miller does not support the Office's inherency conclusion. For

example, Miller discloses that at the end of the 36 encoded bits, the phase state will either be 0 or  $\pi$  radians depending on the header data. The ending phase state will be 0 radians if there is an even number of +1s in the header and will be  $\pi$  radians if there is an odd number of +1s in the header. There is no disclosure in Miller regarding that any constraint length in the header is defined by multiple modulation indices. This teaching alone undercuts the Office's understanding of Miller. Further, there is no teaching or motivation in Miller to combine the reference with the channel estimation technique disclosed by Ho. The same may also be said of Kim. Thus, without any evidence in the references of record, the Office's unsupported conclusion that it would have been obvious to one of ordinary skill in the art to combine Miller, Kim and Ho to teach Applicant's claimed subject matter is without merit. It is apparent that the Office has not met its burden of providing a *prima facie* case that the recited references, alone or in combination, teaches or discloses each and every element of independent Claims 1, 6, 38, 52 and 54. Reconsideration and withdrawal of the rejection of independent Claims 1, 6, 38, 52 and 54 is respectfully solicited.

Claims 2-5, 7, 10, 12, 15-19, 22, 27-29, 30-32, 35, 39, 49, 55 and 60-61 are ultimately dependent upon independent Claims 1, 6, 38 and 54. Independent Claims 1, 6, 38 and 54 are in condition for allowance. By virtue of their dependency and without addressing the additional patentable elements contained therein, reconsideration and withdrawal of the rejection of Claims 2-5, 7, 10, 12, 15-19, 22, 27-29, 30-32, 35, 39, 49, 55 and 60-61 are hereby solicited.



2. Ho, Sasase, Kim, and Toptchiyski

On pages 11-12 of the Office Action, the Office improperly rejects Claims 13 and 50 under 35 U.S.C. §103(a) as being unpatentable over Ho in view of Sasase, Kim and Toptchiyski. Claims 13 and 50 are ultimately dependent upon independent Claims 1 and 38, respectively. Independent Claims 1 and 38 are in condition for allowance. By virtue of their dependency and without addressing the additional patentable elements contained therein, reconsideration and withdrawal of the rejection of Claims 13 and 50 are hereby solicited.

3. Ho, Miller, Kim and Sasase

On pages 12-13 of the Office Action, the Office improperly rejects Claims 20-21, 33-34 and 48 under 35 U.S.C. §103(a) as being unpatentable over Ho in view of Miller, Kim and Sasase. Claims 20-21, Claims 33-34 and Claim 48 are ultimately dependent upon independent Claims 1, 6 and 38, respectively. Independent Claims 1, 6 and 38 are in condition for allowance. By virtue of their dependency and without addressing the additional patentable elements contained therein, reconsideration and withdrawal of the rejection of Claims 20-21, 33-34 and 48 are hereby solicited.

4. Miller and Kim

On pages 13-14 of the Office Action, the Office improperly rejects Claim 53 under 35 U.S.C. §103(a) as being unpatentable over Miller in view of Kim. Applicant submits that these references fail to provide a *prima facie* case of obviousness, and Applicant respectfully requests withdrawal of the rejection under § 103(a).

## Claim 53 recites

In a method of communicating data with a multiple modulation index continuous phase modulation waveform as trellis coded symbols in data frames, the improvement of increasing the data payload of the data frames comprising the steps of: **receiving each data frame at a different frequency, and decoding each data frame independently of the previous data frame without pilot symbols.** (emphasis supplied).

Incorporating the discussion in (1) above regarding Miller and Kim, the Office has not provided any teaching, suggestion or motivation to combine the references to teach the claimed subject matter. For example, Miller provides a synchronization preamble consists of a preamble bit pattern of 192 bits, a 16 bit message and a header preceding the data traffic. The header and structure thereof is discussed above. Applicant, however, cannot find any teaching in Miller of decoding each data frame independently of the previous data frame. While Miller does indeed decode the preamble without pilot symbols, there is no disclosure of decoding *each data frame independently of the previous data frame* and such silence in Miller cannot provide *prima facie* support for a rejection under 35 U.S.C. § 103(a).

Further the Office has not provided any motivation in the art of record to combine the two references as suggested. Rather, the Office merely relies upon the abstract of Kim to support that it would have been obvious to one of ordinary skill in the art to use frequency hopping with CPM to teach Applicant's claimed subject matter. Such a bald conclusion falls short of the burden required by 35 U.S.C. § 103(a). Applicant respectfully requests reconsideration and withdrawal of the rejection of Claim 53.

**Conclusion**

This Amendment has been submitted responsive to the Office Action mailed September 19, 2007. Claims 1-61 remain pending in the subject application.

Applicant believes that the present application is now in condition for allowance and such action is earnestly requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephonic or in-person interview would advance the prosecution of the application.

Should any additional fees be necessary in connection with the filing of this Response, or if a petition for extension of time is required for timely acceptance of the same, such a petition is made and the Office is authorized to charge such fees to **Deposit Account No. 08-0870**.

Respectfully submitted,

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**EXHIBIT A**